

CERTIFICATION REPORT  
FOR  
INFICON SCENTOGRAPH CMS 200  
373 ROUTE 46 WEST, BUILDING E  
FAIRFIELD, NJ 07004

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*Report Generated By:*

Bureau of Sustainable Communities & Innovative Technologies  
Division of Science, Research, and Technology  
New Jersey Department of Environmental Protection  
401 E. State Street  
Trenton, New Jersey 08625  
<http://www.state.nj.us/dep/dsr/bscit.htm>

## INTRODUCTION

In accordance with the Energy and Environmental Technology Verification (EETV) Act at N.J.S.A. 13:1D-134 et seq., the New Jersey Department of Environmental Protection (NJDEP) is required to identify, evaluate, verify, and expedite the commercial use of new environmental technologies that provide significant environmental benefits to the State of New Jersey. To accomplish this, a process has been developed whereby an innovative technology must be verified by New Jersey Corporation for Advanced Technology (NJCAT) before receiving a certification from NJDEP. A certification would allow the technology to be permitted for use by the respective regulatory program(s) within NJDEP.

An innovative technology receiving a certification from NJDEP results in the following:

- 1) The programs that issue permits can rely on the evaluation and verification process to establish contract provisions, protocols, policies, principles and/or technical guidance to develop expedited or more efficient timeframes for review and decision-making of permits or approvals associated with the technology;
- 2) The development and implementation of a series of outreach and education seminars to assist in the deployment and expedited commercial use of the technology; and
- 3) Working closely with the State Treasurer to be included in State bid specifications, as deemed appropriate by the State Treasurer.

On May 4, 2004, NJCAT submitted a verification report to NJDEP to seek a certification for the Inficon Scentograph CMS 200 with SituProbe.

## TECHNOLOGY DESCRIPTION

Inficon's Scentograph CMS 200 with SituProbe combines the sampling and analysis steps into a simple measurement system for analyzing volatile organic compounds (VOCs) in water streams. The SituProbe is the sampling device for the Scentograph CMS 200 for generating accurate and real-time measurements of VOCs directly at or near the sampling point within the water bodies. The goal of Inficon, as stated in the verification report, is to use its device to save customers considerable time and savings by providing real-time results *in lieu* of having to retrieve samples and sending them off for analysis by commercial testing laboratory. This device is described to be rugged and easy to operate while maintaining almost all of the features of a laboratory gas chromatograph without the complications of a cumbersome laboratory operation.

The Scentograph CMS 200 is connected to a laptop computer, which is used for operating the device and transferring measurement data to a database. The SituProbe draws water samples through the flow-through cell prior to purging of the VOCs into a trap. This approach allows for larger sample volumes and consequently higher concentrations of VOCs purged and trapped, thus resulting in detecting lower

concentrations of VOCs. Also, because there is no pumping action or mechanical disturbance to the sample, the device saves on filtration costs when handling oily or highly turbid samples.

Because of the uniqueness in portability, flexibility, adaptability, accuracy and speed, Inficon considers the Scentograph CMS 200 with the SituProbe as an innovative advancement in VOC water monitoring. The Inficon System is considered relatively simple to operate and can be used on a day-to-day basis by a non-chemist. However, it does not completely eliminate the need for a well-trained chemist or technician. Supervision and training, as well as routine proficiency testing on quality control samples, is considered highly important.

#### TECHNOLOGY'S VERIFICATION CLAIM

**The Inficon Scentograph CMS 200 with SituProbe is capable of performing real-time, on-line monitoring for VOCs of regulatory concern down to relevant detection levels, and with data quality that is comparable to the prescribed (USEPA) analytical method.**

#### TECHNOLOGY DEMONSTRATION

The USEPA, through its Environmental Technology Verification (ETV) Program, participated along with the US Department of Defense and the US Department of Energy in the Consortium for Site Characterization. The Consortium conducted a field demonstration (verification) of the Scentograph CMS 200 along with four other field analytical technologies in September 1997. The demonstration was aimed primarily at technologies for the analysis of chlorinated volatile organic compounds in groundwater. It was held at two geographically and climatologically different sites: the US Department of Energy's Savannah River site at Aiken, South Carolina and McClellan Air Force Base, near Sacramento, California.

#### TECHNOLOGY PERFORMANCE

As described in the NJCAT verification report, the data analysis from the studies described above have been reviewed to verify the Inficon claim for the Spectrograph CMS 200 with SituProbe. The studies evaluated the Inficon System for its ability to detect and measure commonly listed VOCs.

In the ETV study, the Inficon System was able to detect and measure 19 of the 32 provided VOC compounds present in the performance evaluation (PE) samples. Inficon was limited to reporting only the ones for which they brought analytical standards for calibration. All 19 compounds reported were VOCs that had significant regulatory interest and are typical of those found in groundwater and surface water. The ETV study also challenged the ability to detect VOC compounds at very low concentration levels (10µg/L) on 10 replicate samples. This tested the technology's capability to perform at or near regulatory action levels. The Inficon System was able to detect 16 of the 18 compounds provided in all 10 replicates without any false negatives.

In the Ohio River Study, the Cincinnati Water Works tested the capability of the Inficon System to detect and measure concentration values of VOCs at low levels in

water. The study included 14 VOC compounds; both chlorinated and non-chlorinated. A PE sample was prepared to contain these 14 VOC compounds at a concentration level of 5 ppb, which was considered a realistic level for early warning monitoring. The Inficon System detected and measured all 14 VOC compounds.

In the Weyerhaeuser study, methanol was the main concern, with a regulatory target limit of 200 ppm. The Inficon System demonstrated the ability to detect and measure at levels lower than that on both the waste clarifiers and lagoon at the plant. Also, this Inficon System measurement has been accepted for methanol monitoring by the State of Georgia DEP.

#### LIMITATIONS

The Scentograph CMS 200 with SituProbe is considered to be a viable device for measuring VOCs in water. However, certain limitations were noted as follows:

- The Inficon System is ideal for situations where target analytes are known or predicted as demonstrated well in the Weyerhaeuser and Ohio River applications. The Inficon System is not designed to be a screening instrument that can simultaneously monitor for a broad range of compounds.
- As with all gas chromatography methods, occasional confirmation should be made to verify results, especially those obtained with single column, single detector or single laboratory. To assure results are conclusive, confirmation of the data from the Inficon System should be made periodically using other columns, detectors, and standards as well as verifying the data periodically against the reference method.
- The Inficon system requires that the operator be a well-trained chemist or technician. Routine proficiency testing on quality control samples is important to the demonstration of successful performance. Also critical is the development and use of quality assurance protocols, including instrument calibration, duplicate and spike samples at defined frequencies and with specific acceptance ranges.

#### NET ENVIRONMENTAL BENEFITS

The Scentograph CMS 200 with SituProbe is capable of generating real-time concentration measurements, down to detection limits, of VOCs in water. As a result, any existing VOCs that violate the regulatory standards can be mitigated quickly, which may reduce potential damage to the environment and human health. With this technology, it is possible that the elimination of the need to transport water samples to fixed laboratories for analysis should result in the reduction of transportation-related toxic emissions.

#### NJDEP CERTIFICATION

After reviewing NJCAT's verification report, NJDEP certifies the Scentograph CMS 200 with SituProbe as a detection device for measuring the VOCs described in Table 1. Therefore, with respect to the VOCs identified in Table 1, **the Inficon Scentograph CMS 200 with SituProbe is capable of performing real-time, on-line monitoring for VOCs of regulatory concern down to relevant detection levels, and with data quality that is comparable to the prescribed (USEPA) analytical method.** Although the Inficon System, as described in the verification report, may be capable of

measuring additional VOCs, the compounds list in Table 1 were the ones actually identified as being detected and measured.

The SituProbe purge method can be used to detect low concentrations of VOCs in water, where in most cases concentrations will range from sub-parts-per-billion levels to hundreds of parts per billion. Higher concentrations (i.e., above 200 ppb) are detected using headspace analysis by syringe injection of the headspace or by trapping headspace volumes directly.

<b>Performance Evaluation (PE) Compounds Calibrated and Reported</b>	
1,1-Dichloroethene	1,1,2-Trichloroethane
Dichloromethane	Tetrachloroethene
1,1-Dichloroethane	Chlorobenzene
1,2-Dichloropropane	1,1,1,2-Tetrachloroethane
Carbon tetrachloride <sup>(a)</sup>	cis-1,3-Dichloropropene
1,2-Dichloroethane <sup>(a)</sup>	trans-1,3-Dichloropropene
Trichloroethene	1,2-Dichloropropane
Toluene	Benzene
Ethyl benzene	trans-1,2-Dichloroethene
1,1-Dichloropropene	cis-1,2-Dichloroethene
Methanol	1,1-Dichloroethylene
Methylene chloride	Chloroform
1,1,1 - Trichloroethane	Tetrachloromethane
Dibromochloromethane	Styrene
Bromoform	1,2-Dichlorobenzene

(a) denotes coeluting pairs

**Table 1.** Volatile Organic Compounds Measured By Inficon System